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10/500,961	07/08/2004	Minoru Ohara	2004-0942A	3412

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EXAMINER	
BAREFORD, KATHERINE A	

ART UNIT	PAPER NUMBER
1715	

NOTIFICATION DATE	DELIVERY MODE
07/30/2010	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/500,961	OHARA, MINORU	
	Examiner	Art Unit	
	Katherine A. Bareford	1715	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 June 2010*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *73-88* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *73-88* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *6/9/10*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on June 9, 2010 has been entered.

With the entry of the amendment claims 1-72 have been canceled, and claims 73-88 (including new claims 87-88) are pending for examination.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 87-88 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 87 and 88 provide that "the diameter of each cooling hole is a diameter extending in a direction parallel to the width of the air passageway slot". This is

confusing as to what is intended. Parent claims 73 and 79, respectively, provide that "each of the cooling holes have a diameter that is larger than a width of the air passageway slot". Page 13 of the specification indicates that the cooling holes and air passageway slots have diameters but do not indicate where the diameters are measured. The Background section of the application and figures 4 and 9, for example, also describe that the cooling holes (5) have a diameter larger than the width of the air passageway slots (1) (see pages 2-3 of the specification), with the cooling holes shown as circular (figure 4). Therefore, if it is considered that the cooling holes of claims 73 and 79 are circular as described in the specification, then the diameter (the term also suggesting the use of a circular cooling hole) will be the same no matter where measured, including parallel to the width of the slot, and always larger than the width and claims 87 and 88 would be not further limiting. If applicant means that the cooling holes can have dimensions other than circular, there is no description of such in the specification and further there is no description of where the diameter should be measured in such a case, and thus the claim would raise the issue of what shape is intended and whether new matter was claimed. While Figure 1 shows a width of hole 22 being wider than that of 21, it is not indicated that the width of hole 22 from the angle shown is the "diameter" unless the hole is circular. For the purpose of examination, either circular or non-circular cooling holes are considered acceptable, but applicant should clarify what is intended, without adding new matter.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 73-84 and 87-88 are rejected under 35 U.S.C. 103(a) as obvious over Clingman et al (US 5130163), as evidenced by "GE Silicones RTV 11" Data Sheet (hereinafter RTV 11 Sheet), and in view of Kang et al (US 5800695) and the admitted state of the prior art, and optionally, further in view of Montierth (US 4411856).

Claims 73, 75, 78, 79, 81, 84: Clingman teaches a method of forming a thermal barrier coating by spray coating over a surface of a component. Column 1, lines 35-60. The component has cooling holes (perforations) made in it. Figure 2 and column 2, lines 15-50 (see perforations 22, for example). A masking process where masking plugs (pins) are inserted into the cooling holes is provided. Column 2, lines 55 through column 3, line 20. Silicone rubber, in a viscous spreadable state is applied and forced into the holes, and then dried and hardened to an elastomeric body. Column 2, line 55 through column 3, line 20. The masking plug can thus be composed of silicone rubber. Column 2, lines 60-65. The rubber would be "elastic" as it is described as "elastomeric". Column 3, lines 10-20. The masking process includes forming the plugs so that they do not protrude above the surface of the component. Column 3, lines 1-11 and figure 4.

Then blasting treatment process is provided where the surface of the component is blasted and coarsened (roughened) to prepare the surface for coating. Column 3, lines 20-30. Then a spray coating process is provided where a thermal barrier coating is formed by spray coating over the surface of the coarsened component. Column 3, lines 30-65 and column 1, lines 35-45. As to filling the holes with "liquid elastic body", Clingman teaches that the exemplary silicone rubber that is used is RTV-11 from General Electric (column 2, lines 60-65) and that it is applied and cured (column 3, lines 10-20). RTV 11 Sheet indicates that the cured RTV 11 has a shrinkage of 0.6 %. Page 2. RTV 11 Sheet also indicates that the material is easily pourable in consistency. Page 2. Since Clingman teaches the use of a flowable, spreadable silicone rubber sealant of RTV 11; and RTV 11 is inherently understood to be easily pourable, one of ordinary skill in the art would understand that the state of the silicone rubber used in Clingman is a "liquid", or even if the flowable, spreadable silicone rubber sealant of Clingman is not understood to inherently be a liquid, the teaching of Clingman of using a flowable, spreadable material would at least suggest that the material be in the form of a liquid, as the broad teaching of flowable, spreadable material would be inclusive of liquid.

(A) Clingman as evidenced by RTV 11 Sheet does not specifically teach that liquid silicone rubber is injected into the cooling holes, where an injection amount of the liquid is adjusted so that the surface of the elastic body injected into each of the cooling holes protrudes above the surface when injected, and so that the masking pins after hardening do not protrude.

Kang teaches providing maskant into cooling holes in a gas turbine engine component. Column 1, lines 1-10. The maskant is provided into the holes by injecting into the cooling holes in a liquid state, and then cured to harden. Column 2, lines 15-45. The maskant is filled into the cooling holes so that the maskant is flush with the surface of the component. Column 2, lines 25-30. Kang teaches that when injecting the maskant, care should be taken that the maskant is not present on surfaces intended to be coated. Column 2, lines 39-40 and figure 4. Kang further teaches to remove any maskant that is present on the outside of the component. Column 2, lines 40-41.

Montierth teaches that when making masking members using silicones, for example, care should be taken to account for any shrinkage which occurs in the fabrication of the mask. Column 8, lines 5-35 and 55-65.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Clingman, as evidenced by RTV 11 Sheet, to inject the maskant in a liquid state as suggested by Kang, with an expectation of providing desirable protected surfaces because Clingman, as evidenced by RTV 11 Sheet, suggests to provide the silicone rubber maskant in a liquid state and force it into the holes followed by curing and hardening, and Kang teaches that a conventional desirable way to force maskant into cooling holes is to inject it in a liquid form and then cure to harden. Furthermore, as to the adjusting of the amount of the liquid elastic so as to protrude when injected and harden to shrink so that they do not protrude, Clingman as evidenced by RTV 11 Sheet and in view of Kang would suggest this as well, since

Clingman provides adjusting the maskant to a desired position and height of the RTV 11 maskant which in use is to be even with the surface of the component and not protrude (column 3, lines 5-10 and figure 5) and Kang wants the cooling holes to be filled so that the maskant is flush with the surface of the component and maskant is not on surfaces intended to be coated, and further shows a slight protrusion on coating (column 2, lines 25-30, 35-40, figure 4) and as shown by RTV 11 sheet, the RTV 11 maskant has a known shrinkage amount, or at the least would be expected to shrink at least some degree, during curing, and one of ordinary skill in the art would clearly take this known or expected shrinkage amount into consideration when applying the material so that a desired amount of coverage occurs so that what is desired to be masked is actually masked during the coating process, so the maskant would slightly protrude on filling and shrink to not protrude, such as by being even with the surface, when the material has hardened, and coating is to be applied, since, for example, if a material is to be even with a surface after hardening, and shrinks on hardening, it needs to be provided in an amount of more than even (protruding) before shrinking.

Optionally, as to the adjusting of the amount of the liquid elastic so as to protrude when injected and harden to shrink so that they do not protrude, it would have been obvious to modify Clingman as evidenced by RTV 11 Sheet and in view of Kang to provide this as well as suggested by Montierth, since Clingman provides adjusting the maskant to a desired position and height of the RTV 11 maskant which in use is to be even with the surface of the component and not protrude (column 3, lines 5-

10 and figure 5) and Kang wants the cooling holes to be filled so that the maskant is flush with the surface of the component and maskant is not on surfaces intended to be coated, and further shows a slight protrusion on coating (column 2, lines 25-30, 35-40, figure 4) and as shown by RTV 11 sheet, the RTV 11 maskant has a known shrinkage amount, or at the least would be expected to shrink at least some degree, during curing, and Montierth provides that one of ordinary skill in the art would take this known or expected shrinkage amount into consideration when applying the material when forming a mask, so that a desired amount of coverage occurs so that what is desired to be masked is actually masked during the coating process, so the maskant would slightly protrude on filling and shrink to not protrude, such as by being even with the surface, when the material has hardened, and coating is to be applied, since, for example, if a material is to be even with a surface after hardening, and shrinks on hardening, it needs to be provided in an amount of more than even (protruding) before shrinking.

(B) As to the cooling holes being formed in the surface of the component such that the cooling holes extend to an air passageway slot formed in the component, Kang provides that it is known when providing cooling holes in gas turbine engine components for the cooling holes 4 to be formed in the surface of the component such that the cooling holes extend to an air passageway slot (cooling passage 2) formed in the component (Figure 2 and column 2, lines 15-30). The previously cited references do not specifically teach that each of the cooling holes have a diameter that is larger than a width of the air passageway slot (claims 73, 79), or that the component is a combustion

transition piece of a gas turbine engine with the cooling holes made in a internal periphery surface of a wall constituting the combustor transition piece (claims 75, 81). Clingman does teach that the component is to be used in a gas turbine engine combustor, for example (column 2, lines 20-25) and the cooling holes and the coating can be provided in an internal periphery surface of the component (column 1, lines 35-60 and column 2, lines 30-35, the inside lamina 12 is the exposed surface to be treated).

However, the admitted state of the prior art (pages 1-3 of the specification and figures 4 and 9) teaches that turbine components to be provided with thermal barrier coatings on an internal periphery surface of a wall commonly include combustor transition pieces (103), and these are conventionally provided with air outlet holes (cooling holes) 5 that extend to air passageway slots 1, where the cooling holes are masked before the thermal barrier coating is applied. The admitted state of the prior art further provides that diameters of the holes 5 are larger than the width of the air passageway slots 1 (see page 2 and figures 4 and 9).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Clingman, as evidenced by RTV 11 Sheet, and in view of Kang, and optionally, further in view of Montierth to use the process on a combustor transition piece, for example with cooling holes with diameters larger than the width of air passageway slots that the cooling holes extend to as suggested by the admitted state of the prior art, with an expectation of providing desirable protected surfaces because Clingman, as evidenced by RTV 11 Sheet, and in view of Kang, and optionally, further

in view of Montierth teaches to provide thermal barrier coatings on internal periphery of components to be used in a gas turbine engine combustor (see Clingman, column 1, lines 35-60 and column 2, lines 20-35), and the admitted state of the prior art teaches that a conventional part of a combustor in a gas turbine engine that contains cooling holes to be treated on a internal periphery with a thermal barrier coating is a combustor transition piece that has cooling holes with diameters larger than the width of air passageway slots that the cooling holes extend to.

Claims 74, 80: Clingman provides that the cooling holes are not "drilled through" as the holes do not extend all the way through the component, for example. Column 2, lines 15-50 and figure 2 (shrouded side perforations 18 are offset relative to perforations 22).

Claims 76, 82: Clingman teaches that the material of the masking pin is elastic and resistant to blasting (column 3, lines 25-30), is resistant to the heat caused by the spray coating (as the plug remains after thermal spray coating and must be removed, column 4,lines 25-35), has stripping easiness as it can be entirely removed after coating (as the plug is stripped out, and as the air flow remains the same after the treatment, column 5, lines 1-10), and as to adherence and wetness to prevent thermal barrier coating material from accumulation, teaches that the bond coat and top coat do not readily adhere to the plug material and almost all particles do not adhere (column 3, lines 45-55 and column 4, lines 1-6).

Claims 77, 83: Clingman provides that the masking plug can be composed of silicone rubber. Column 2, lines 60-65. The rubber would be "elastic" as it is described as "elastomeric". Column 3, lines 10-20.

Claims 87-88: in the process suggested by Clingman, as evidenced by RTV 11 Sheet, and in view of Kang and the admitted state of the prior art, and optionally, further in view of Montierth, it would be suggested that the diameter of each cooling hole is a diameter extending in a direction parallel to the width of the air passageway slot, with an expectation of similar treating results, since as shown by Figure 4 of the admitted state of the prior art the cooling holes would be circular, so that the diameter would be the same measured at any location, including in a direction extending in a direction parallel to the width of the air passageway slot and therefore that measurement of diameter would also provide that the diameter of the cooling holes is larger than the width of the air passageway slots as provided by the admitted state of the prior art.

6. Claims 85-86 are rejected under 35 U.S.C. 103(a) as being unpatentable over Clingman, as evidenced by RTV 11 Sheet, and in view of Kang and the admitted state of the prior art, and optionally, further in view of Montierth, as applied to claims 73-84 and 87-88 above, and further in view of Emer (US 6380512).

Clingman, as evidenced by RTV 11 Sheet, and in view of Kang and the admitted state of the prior art, and optionally, further in view of Montierth, teaches all the

features of these claims except the specific chamfering of the thermal barrier coating around the cooling holes with the masking pins remaining in the holes. Clingman does teach that the top coat may accumulate as a projecting lip 48 and may sometimes completely shroud the hole, which should be mechanically pieced through the top coat over the plug of maskant. Column 4, lines 5-30.

Emer teaches that it is well known that after coating over components with cooling holes with coatings such as thermal barrier coatings, to remove coating material which may have obstructed any or all of the cooling holes to reestablish the cooling hole diameter and/or establish a proper airflow using a laser. Column 2, lines 35-60.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Clingman, as evidenced by RTV 11 Sheet, and in view of Kang and the admitted state of the prior art, and optionally, further in view of Montierth, to chamfer (understood, by definition to mean cut off the edge or corner) the thermal barrier coating around the cooling holes while the masking pins remain in the cooling holes after forming the thermal barrier coating as suggested by Clingman and Emer, with an expectation of providing desirable protected surfaces because Clingman provides the suggestion of mechanically piercing holes that have been obstructed with coating while the maskant is still present, and Emer teaches that is also well known to remove coating material which may have obstructed any or all of the cooling holes to reestablish the cooling hole diameter and/or establish a proper airflow after coating, indicating that it may be desirable to open the holes after complete or partial

obstruction, and this reopening after partial obstruction would by definition chamfer the thermal barrier coating around the cooling holes, since the edge of the coating would be cut off.

7. Loringer (US 6573474) teaches that it is known to provide an angled surface on a thermal barrier coating by drilling around the hole area. Figures 1-2 and column 2, lines 40-50.

Response to Arguments

8. Applicant's arguments filed June 9, 2010 have been fully considered but they are not persuasive.

Applicant has argued that the art to Clingman, RTV 11 Sheet, Kang and Montierth does not provide claimed cooling holes formed in the surface of the component such that the cooling holes extend to an air passageway slot formed in the component, each of the cooling holes having a diameter that is larger than a width of the air passageway slot, as now required in independent claims 73 and 79.

The Examiner has reviewed these arguments, however, the above rejection has been maintained. Due to the addition of these cooling hole feature requirements to the independent claims, those claims are now further rejected using the admitted state of the prior art, which as noted above, teaches the conventionality of such cooling hole features in a combustor transition piece for a gas turbine engine. As previously

discussed with regards to claims 75 and 81 it would have been obvious to modify the process of Clingman, as evidenced by RTV 11 Sheet, and in view of Kang, and optionally, further in view of Montierth, to perform the process on combustor (combustion) transition pieces as described by the admitted state of the prior art (note the Office Action of December 9, 2009, paragraph 8). When providing such a combustor transition piece, it would further be suggested to have the cooling hole features as described by the admitted state of the prior art.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Katherine A. Bareford whose telephone number is (571) 272-1413. The examiner can normally be reached on M-F(6:00-3:30) First Friday Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy H. Meeks can be reached on (571) 272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Katherine A. Bareford/
Primary Examiner, Art Unit 1715